

9. Quality of Service

This section summarizes various kinds of service quality data filed by certain local exchange telephone companies in April 2002 covering the 2001 calendar year. The Federal Communications Commission (FCC or Commission) does not impose service quality standards, *per se*, on communications common carriers. Rather, the Commission annually monitors carrier-submitted data and publishes the most recent quality of service information both in this *Monitoring Report* and in a separate report on recent quality of service trends.¹ The data contained here provides an initial view of 2001 quality of service data including customer-initiated trouble reports and company responses. This section publicizes information about company performance and, specifically, statistics about company responsiveness to network failures and associated consumer complaints. We include, in the tables following the text of this section, company comparison data about various service parameters including installation, maintenance, switch downtime, and common trunk blocking, along with associated customer perception data.

Background

At the end of 1983, anticipating AT&T's imminent divestiture of its local operating companies, the Commission directed the Common Carrier Bureau to establish a monitoring program that would provide a basis for detecting adverse trends in network service quality. The data were received semiannually, typically in March and August, and formed the basis for FCC summary reports published in June 1990 and July 1991.

With the implementation of price-cap regulation for certain local exchange carriers, the Commission made several major changes to the service quality monitoring program beginning with reports filed in 1991. First, the Commission expanded the class of companies filing reports to include non-Bell carriers subject *to* price-cap regulation.² Second, the Commission included service quality reports as part of the Automated Reporting Management Information System (ARMIS).³ Third, the Commission ordered significant changes to the kinds of data reported.⁴

- 1 The last report was Industry Analysis Division. Common. Carrier Bureau, Federal Communications Commission, *Quality of Service of the Local Operating Companies* (December 5, 2001), which covered data for 1999 and 2000. It includes trended **ARMIS** data, prepared in graphical form. Other graphs are available on the ARMIS web site at www.fcc.gov/wcb/armis/sq/.
- 2 *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Second Report and Order, 5 FCC Rcd 6786, 6827-31 (1990) (*LEC Price Cap Order*) (establishing the current service quality monitoring program and incorporating the service quality reports into the ARMIS program), Erratum, 5 FCC Rcd 7664 (Com. Car. Bur. 1990), *modified on recon.*, 6 FCC Rcd 2637 (1991); *aff'd sub nom.*, *Nat'l Rural Telecom Ass'n v. FCC*, 988 F.2d 174 (D.C. Cir. 1993).
- 3 *LEC Price Cap Order*, 5 FCC Rcd at 6827-30. The ARMIS database includes a variety of mechanized company financial and infrastructure reports in addition to the quality-of-

Following these developments, the Commission released service quality *summary* reports in February 1993, March 1994, March 1996, September 1998, December 1999, and December 2001.

Pursuant to requirements in the Telecommunications Act of 1996,⁵ the Commission reduced the frequency of the filed data from quarterly to annual submissions.⁶ In May 1997 relevant definitions were clarified further, and these changes have been reflected starting with data covering the 1997 calendar year.⁷ This section represents an early view of data filed for 2001, which are subject to revision by the companies.

Data

The source data used in preparing this section can be extracted from an online database maintained on the FCC web site at <www.fcc.gov/wcb/armis/db>. The data are also available from Qualex International, at (202) 863-2893. Selected paper filings are available in the FCC Reference Room at 445 12th Street, SW, Washington, D.C. 20554.

The data presented in this section summarize ARMIS 43-05 and 43-06 carrier filings for 2001 and represent an initial view of the data. The data is subject to continuing review and may be updated as problems are discovered and corrected. The tables accompanying this section

service reports. Most data are available disaggregated to a study area or state level

- 4 *LEC Price Cap Order*, 5 FCC Rcd at 6827-30; *See Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Memorandum Opinion and Order, 6 FCC Rcd 2974 (Com. Car. Bur.1991) (*Service Quality Order*), reconsideration 6 FCC Rcd 7462 (Com. Car. Bur. 1991). Previously the Common Carrier Bureau had collected data on five basic service quality measurements from the Bell operating companies. These were customer satisfaction levels, dial tone delay, transmission quality, on time service orders, and percentage of call blocking due to equipment failure.
- 5 Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996 Act).
- 6 Orders implementing filing frequency and other reporting requirement changes associated with implementation of the Telecommunications Act of 1996 are as follows: *Implementation of the Telecommunications Act of 1996: Reform of Filing Requirements and Carrier Classifications*, CC Docket No. 96-193, Order and Notice of Proposed Rulemaking, 11 FCC Rcd 11716 (1996); *Revision of ARMIS Quarterly Report (FCC Report 43-01) et al.*, CC Docket No. 96-193, Order, 11 FCC Rcd 22508 (Com. Car. Bur.1996); *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Memorandum Opinion and Order, 12 FCC Rcd 8115 (1997); *Revision of ARMIS Annual Summary Report (FCC Report 43-01) et al.*, Order, 12 FCC Rcd 21831 (Com. Car. Bur. 1997).
- 7 *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Memorandum Opinion and Order, 12 FCC Rcd 8115 (1997).

highlight many of the data elements now received. Tables include data from each major holding company: the regional Bell companies, including Verizon GTE, and Sprint.’

The data items summarized in the tables largely contain raw data measurements that are not scaled by company indexing processes. This removes a degree of procedural variation among companies. For example, companies file a fairly extensive amount of raw data about switching outages, including outage durations and number of lines affected.

The data summarized in this section contain sums, or weighted averages, of data reported by states or study areas and may be useful in assessing overall trends. Where information is reported in terms of percentages or average time intervals, data presented here are based on a composite of individual study area data that are calculated by weighting the percentage or time interval figures. For example, we weight the percent of commitments met by the corresponding number of orders provided in the filed data.’

The items contained in the tables are summarized below. Installation, maintenance and customer complaint data are shown in Table 9.1, and switch downtime and trunk servicing data are shown in Table 9.2. Installation and maintenance data are presented separately for services provided to end users and for interexchange carrier access facilities. Outage data categorized by cause are shown in Table 9.3. Customer perception data are contained in Table 9.4 and the associated survey sample sizes are contained in Table 9.5.

8 In February 1992, United Telecommunications Inc. became Sprint Corporation [Local Division]; and in March 1993, Sprint Corporation acquired Centel Corporation. SBC, Pacific Telesis and Ameritech facilities are shown separately despite the merger of the SBC and Pacific in April 1997 and SBC and Ameritech in October 1999. Bell Atlantic’s merger with GTE and its new name Verizon Communications is now reflected in this report; however the GTE entities continue to be shown separately. While the data summaries in this report are based on ARMIS data, additional service quality data associated with these companies have been filed with the Commission pursuant to the mergers.

9 Company composite data were typically recalculated on a consistent basis from study area data, as a number of company-supplied composites could not be confirmed. Although the companies have prepared their own company rollups, we have discovered various inconsistencies or inaccuracies in some of these company-prepared composites. We have therefore weighted data involving percentages or time intervals in order to arrive at the more consistent composite data shown in the tables and expect that the companies will want to review their procedures for preparing composites. Parameters used for weighting in this section were appropriate for the composite being calculated and were based on the raw data filed by the carriers but are not necessarily shown in the tables. For example, we calculate composite installation interval data by summing the individual study area results multiplied by the number of installation orders reported for each study area and then dividing the result by the total number of orders.

This section has attempted to display data elements that have remained roughly comparable over the past few years. More detailed information on the raw data from which this section has been developed is contained on the Commission's website for the ARMIS database noted above. In addition, complete data descriptions are available in the Commission Orders referenced above." The row numbers and columns associated with the raw source data in the ARMIS 43-05 report are included in the descriptions below."

1. Percent of Installation Commitments Met

Percent of installations that were met by the date promised by the company to the customer. It is presented separately for residential and business customers' local service (row 132, columns f and i or af and ai, respectively) and access services provided to carriers (row 112, columns a and c or aa and ac).

2. Average Installation Interval (in days)

Average interval (in days) between the installation service order and completion of installation. It is shown separately for access services provided to carriers (row 114, column a and c or aa and ac) and for residential and business customers' local service (row 134, columns f and i or af and ai, respectively). Data on intervals for missed installations (rows 113 and 133) were replaced by average interval described above.

10 *See* footnote 6, *supra*.

11 For rows 110-121 in the raw machine readable data sets, column a or aa is the first column; for rows 130 to 151, column d or ad is the first column; for rows 180 to 190, column k or ak is the first column; for rows 200 to 214, column n or an is the first column; for rows 220 to 319 and 333-500, column t is the first column; and for rows 320 to 332, column aa or da is the first column. The companies also file printed copies of their submissions where rows 110-121 are designated as Table I, rows 130-170 are designated as Table II, rows 180-190 are designated as Table III, rows 200-214 are designated as Table IV, rows 220-319 and 333-500 are designated as Table IV-A, and rows 320-332 are designated as Table V. Note that some of the row numbers in the data such as rows 142, 143 and 160 do not appear in numerical order. In addition to definitional wording changes, most of which are minor, rows 111, 131, 160 and 170 (missed installations for customer reasons and subsequent trouble reports) have been added with the 1997 data; however, not all companies have populated the added rows. Many column designations have also been changed and most column labels are now preceded by the letter "a". The reader should note that there are variations in numbers of switches and access lines in the various ARMIS reports that may lead to inconsistencies when comparing data sources; however, these variations are not believed to be significant enough to alter the observations made in this section. Because the entire row and column descriptions and definitions for each year in question are too voluminous to reproduce here, the reader should refer *to* the relevant Commission Order referenced in a prior footnote describing requirements for the specific data year of interest.

3. Average Repair Interval

Average time (in hours) for the company to repair access lines and service subcategories for switched access, high-speed special access, and all special access. Only data for switched and special access services provided to carriers are presented. (See row 121, column a and c or aa and ac.)

4. Initial Trouble Reports per Thousand Access Lines

Calculated as the total count of trouble reports reported as "initial trouble reports," divided by the number of access lines in thousands. (Note that multiple calls within a 30 day period known to be associated with the same problem are counted as a single initial trouble, and the number of access lines reported and used in the calculation is the total number of access lines divided by 1,000.) This item is subcategorized by Metropolitan Statistical Areas (MSA) (the sum of row 141, column d or ad and row 141, column g or ag divided by the sum of row 140, column d or ad and row 140, column g or ag); non-MSA (the sum of row 141, column e or ae and row 141, column h or ah divided by the sum of row 140, column e or ae and row 140, column h or ah); residence (row 141, column f or af divided by row 140, column f or af); and business (row 141, column i divided by row 140, column i or ai). Note that access lines for data filed in 1997 were requested in whole numbers, but were requested in thousands for prior years.

5. Found or Verified Troubles per Thousand Access Lines

Calculated as described in item 4, above. Represents the number of trouble reports in which the company identified a problem (row 141, column j or aj less row 143, column j or aj divided by row 140, column j or aj).

6. Repeat Troubles as a percent of Initial Trouble Reports

Calculated as the number of initial trouble reports acted on that recur, or remain unresolved, within 30 days of closing out the initial trouble report, divided by the number of initial trouble reports as described above (row 142, column j or aj divided by row 141, column j or aj). Provides a measure of the effectiveness of the company in resolving troubles at the outset. Subcategorized by **MSA**, non-MSA, residence, and business. (Also refer to the discussion of data qualifications that follows.)

7. Complaints per Million Access Lines

The number of residential and business customer complaints, per million access lines, reported to state or federal regulatory bodies during the reporting period. (Total residence complaints are calculated as the sum of row 331, column aa and row 332, column aa; total business complaints are calculated as the sum of row 321, column aa or da and row 322, column aa or da).

8. Number of Access Lines, Trunk Groups and Switches

The count of in-service access lines (row 140, column j or aj), trunk groups (row 180, column k or ak), and switches (the sum of row 200, column n or an and row 201, column n or an or the sum of row 210, column n or an through row 214, column n or an). Trunk groups only include common trunk groups between Local Exchange Carrier (LEC) access tandems and LEC end offices. When comparing current data herein with data in prior reports the reader should note that access lines were reported in thousands in pre-1997 data submissions. Starting with 1997 data submissions access line data was requested in whole numbers. Data for 1995 was annualized as the average of quarterly data.

9. Switches with Downtime

Number of network switches experiencing downtime and the percentage of the total number of company network switches experiencing downtime (row 210, column o or ao through row 214, column o or ao or the sum of row 200, column o or ao and row 201, column o or ao).

10. Average Switch Downtime in Seconds per Switch

Total switch downtime divided by the total number of company network switches indicates the average switch downtime in seconds per switch. Shown for all occurrences (the sum of row 200, column p or ap and row 201, column p or ap, multiplied by 60 and divided by the sum of row 200, column n or an and row 201, column n or an) and for unscheduled occurrences greater than 2 minutes (data derived from rows 220 through 319 and rows 333 through 500, columns t through z in the source data divided by the sum of rows 200 and 201, column n or an).

11. Unscheduled Downtime Over 2 Minutes per Occurrence

Number of occurrences of more than 2 minutes in duration that were unscheduled, the number of occurrences per million access lines, the average number of minutes per occurrence, the average number of lines affected per occurrence, the average number of line-minutes per occurrence in thousands, and the outage line-minutes per access line. For each outage, the number of lines affected was multiplied by the duration of the outage to provide the line-minutes of outage. The resulting sum of these data represents total outage line-minutes. This number was divided by the total number of access lines to provide line-minutes-per-access-line, and, by the number of occurrences, to provide the line-minutes-per-occurrence. This categorizes the normalized magnitude of the outage in two ways and provides a realistic means to compare the impact of such outages between companies. A separate table is provided for each company showing the number of outages and outage line-minutes by cause. (These items are derived from data in rows 220 through 319 and 333 through 500, columns t through z, in the source data).

12. Scheduled Downtime Over 2 Minutes per Occurrence

Determined as in item 11, above, except that it consists of scheduled occurrences. (These items are derived from data contained on rows 220 through 319, and rows 333 through 500, columns t through z, in the source data).

13. Percent of Trunk Groups Meeting Design Objectives

This data item provides the percentage of trunk groups exceeding an industry standard for blocking over the reporting interval (the sum of rows 189 and 190, column k, divided by row 180, column k for 1995 data and the sum of rows 189 and 190, column *ak* divided by row 180 column *ak* starting with 1996 data). The trunk groups measured and reported are interexchange access facilities. These represent only a small portion of the total trunk groups in service.

Qualifications

The data presented in this section are a first view of this year's filed data. As in the past, we have identified several pitfalls and general qualifications in using quality of service data.

Overall, we caution readers to be aware of potential methodological shortcomings and inconsistencies associated with use of the service quality data presented in this section. First, carriers periodically revise submitted data as problems are discovered, and data presented here may contain errors or may not reflect the latest updates. Second, although the data are subject to an initial screening by Commission staff, and certain problems may have been corrected in carrier-submitted revised filings, there are still potential flaws in the data that will only become apparent when users subject the data to further analysis or compare it with data from other sources.¹²

Third, Commission staff have recalculated holding company totals or data composites, and these might not match company-filed totals or composites.¹³ This is primarily due to calculation variations regarding, *e.g.*, percentages or average intervals that require weighting in

12 For example, small variations between GTE prepared composites and those that we calculated independently appear to have been caused by inclusion or exclusion of data from study areas such as Micronesia (GTMC) and Alaska (GTAK).

13 Past Commission orders have modified definitions in the data collection process in an attempt to remove perceived ambiguities. We note, however, that because this section contains many items whose composites are calculated as weighted sums or averages, we have recalculated company composites for this section to improve consistency and we have pointed out general cautions in using the data. We expect that this will be useful to the companies in their review of internal processes associated with calculation of composites and may enable us to use company-calculated composites in the future.

the calculations. Carriers have updated earlier filings numerous times. The data presented here typically reflect data for the most recent ARMIS filing of April 2002. We therefore caution the reader that some of the problems that may be discovered in connection with the data presented here resulted from differences in aggregation methodologies, errors including data irregularities, or data revisions that either could not be used or were not available in time for use in this section.¹⁴

Fourth, outage measurements should be considered in context. For example, the average number of lines affected per event would tend to favor a company with a larger number of smaller or remote switches with lower line counts per switch, while the average outage duration might favor a company with larger switches. Thus, using the average number of lines per event measurement, one 25,000 line switch that is out of service for five minutes would appear to have a greater service impact than ten 2,500 line switches that are out of service for five minutes. That is why we present a grouping of outage measurements that include the outage line-minutes per event and per 1,000 access lines. We have also added the number of outages per switch as another metric for measuring a company's performance.

Except in the calculation of company composites, we have not, in most cases, deleted or adjusted data. It is expected that the process of data correction will continue as problems are further identified and corrected.

This section presents data that reflect several different ways of measuring switch outages, including line-minutes-per-access line and line-minutes-per-event. Outage line-minutes is a measure that combines both duration and number of lines affected in a single parameter. We derived this parameter from the raw data by simply multiplying the number of lines involved in each outage by the duration of the outage, summing the resulting values and dividing the sum by the total number of access lines or events. Because outage measurements tend to exhibit more variability than other measurements, we have shown in the tables several ways of presenting the results. Improvements in responding to outages by some of the reporting companies may be associated with efforts to improve switch reliability, including working with manufacturers to replace poorly performing switches and to improve performance of existing ones.

Because performance within any single data category may vary widely over time, evaluating a given company's performance by looking at a single measurement may be misleading, especially considering that long lead times might be needed to correct certain problems or that corrections might already be underway. On the other hand, problems that are observed in several service quality measurement categories could also reflect overall service deterioration. We believe that customer complaint and perception levels should be viewed in the context of other measures of performance. However, we have found that it is practically

14 We have noted that total access lines as reported in the last column of row 140 does not always agree with the sum of the first column entry of rows 320 and 330. Variations in access line and switch counts may affect normalized outage data reported in the tables. In some instances irregularities inherent in the underlying data at the study area level may have resulted in other undetected errors in the calculated composites.

impossible to ascertain whether changes in aggregate customer complaint levels result from developments in a single problem area or reflect a perception of a wider ranging set of problems. For these reasons and because data is now filed annually rather than quarterly, we recommend the use of both trend and pattern analysis of the data.

Finally, one of the measurements for which service quality data are collected is the number of service affecting troubles reported by customers. Because of the various classifications of trouble reports, in 1997, the Commission addressed problems relating to subtleties in the definitions associated with the terms "initial" and "repeat" trouble reports.¹⁵

All of these reflections and observations essentially relate to the issue of maintaining the necessary continuity of data measurements. While an attempt has been made to preserve continuity up to this point, detection of errors and changes in reporting requirements that are deemed necessary will introduce discontinuities into certain time series data or eliminate certain items of data entirely.

We note that changes in service quality measurements may be dictated by changes in technology and that the companies periodically wish to change their internal measurement procedures, from which regulatory data are drawn, adding difficulty to long-term measurements.¹⁶ In some cases procedural changes in the data measurement and collection process may be subtle enough so that they are not immediately noticeable in the data. Significant changes in company procedures, however, usually result in noticeable and abrupt changes in data levels. It appears that at least some of these changes are not reported to the Commission. These factors tend to limit the number of years of data available to track service quality trends and will affect the frequency and availability of summary reports that are prepared by the Commission. In spite of these caveats, it appears that customer satisfaction and complaint data have exhibited adverse trends for some of the companies in recent years.

15 See *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Memorandum Opinion and Order, 12 FCC Rcd 8115, 8133 (1997); *Revision of ARMIS Annual Summary Report (FCC Report 43-01) et al.*, Order, 12 FCC Rcd 21831, 21835 (Com. Car. Bur. 1997). See also Industry Analysis Division, Common Carrier Bureau, Federal Communications Commission, *Quality-of-service for the Local Operating Companies Aggregated to the Holding Company Level* (March 22, 1996) (mimeo 60268) for further discussion.

16 For those interested in trending customer perception data in this section with that available in prior Reports, it should be noted that Bell Atlantic, for example, reported changes to its customer perception surveys that were reflected in its post-1990 data, and Pacific Telesis had noted changes effective in January 1992.

Table 9.1
Installation, Maintenance, & Customer Complaints
Company Comparison - 2001

| Company | BellSouth | Qwest | SBC Ameritech | SBC Pacific | SBC Southwestern | Verizon North | Verizon South | Verizon GTE | Sprin |
|---|-----------|-------|------------------|----------------|---------------------|------------------|------------------|----------------|-------|
| ACCESS SERVICES PROVIDED TO INTEREXCHANGE CARRIERS -- SWITCHED ACCESS | | | | | | | | | |
| Percent Installation Commitments Met | 99.5 | 92.9 | 91.8 | 80.6 | 73.7 | 96.6 | 92.4 | 96.0 | 91.0 |
| Average Installation Interval (days) | 29.5 | 16.1 | 52.4 | 26.9 | 40.3 | 60.8 | 48.0 | 26.3 | 15.4 |
| Average Repair Interval (hours) | 1.0 | 3.2 | 24.3 | 15.7 | 52.5 | 3.0 | 5.2 | 13.1 | 5.9 |
| ACCESS SERVICES PROVIDED TO INTEREXCHANGE CARRIERS -- SPECIAL ACCESS | | | | | | | | | |
| Percent Installation Commitments Met | 96.3 | 95.0 | 92.2 | 74.6 | 86.8 | 77.1 | 84.8 | 92.4 | 90.3 |
| Average Installation Interval (days) | 17.5 | 15.1 | 15.3 | 20.7 | 13.9 | 32.4 | 23.9 | 22.7 | 14.3 |
| Average Repair Interval (hours) | 3.4 | 2.7 | 5.8 | 3.9 | 4.7 | 13.1 | 3.0 | 12.8 | 6.7 |
| LOCAL SERVICES PROVIDED TO RESIDENTIAL AND BUSINESS CUSTOMERS | | | | | | | | | |
| Percent Installation Commitments Met | 99.9 | 99.2 | 98.7 | 99.4 | 98.7 | 98.7 | 99.0 | 98.1 | 96.5 |
| Residence | 99.9 | 99.3 | 98.8 | 99.5 | 98.8 | 98.8 | 99.0 | 98.3 | 96.6 |
| Business | 99.9 | 98.5 | 97.3 | 98.6 | 98.1 | 98.0 | 98.5 | 96.1 | 95.9 |
| Average Installation Interval (days) | 1.3 | 0.8 | 2.1 | 1.5 | 1.0 | 1.0 | 1.4 | 0.8 | 3.5 |
| Residence | 1.3 | 0.6 | 2.1 | 1.3 | 1.0 | 0.9 | 1.3 | 0.6 | 3.2 |
| Business | 1.7 | 2.3 | 3.0 | 2.9 | 1.0 | 1.6 | 2.6 | 1.8 | 5.2 |
| Initial Trouble Reports per Thousand Lines | 300.1 | 128.2 | 191.8 | 146.8 | 212.3 | 179.1 | 145.5 | 162.6 | 206.3 |
| Total MSA | 283.6 | 128.3 | 192.3 | 144.7 | 199.2 | 182.0 | 146.9 | 157.3 | 202.3 |
| Total Non MSA | 391.8 | 128.0 | 186.1 | 197.9 | 275.2 | 159.3 | 129.6 | 187.9 | 214.3 |
| Total Residence | 342.8 | 158.5 | 250.4 | 191.2 | 278.2 | 210.3 | 183.2 | 191.4 | 245.0 |
| Total Business | 187.7 | 66.7 | 86.8 | 70.1 | 93.5 | 117.0 | 76.7 | 103.0 | 104.6 |
| Troubles Found per Thousand Lines | 159.5 | 63.8 | 122.8 | 115.6 | 140.8 | 129.0 | 102.5 | 135.4 | 124.0 |
| Repeat Troubles as a Pct. of Trouble Rpts. | 21.3% | 28.3% | 30.5% | 15.8% | 16.7% | 19.9% | 20.1% | 13.4% | 14.2% |
| Total Residence | 22.2% | 27.8% | 31.5% | 16.4% | 17.0% | 19.9% | 20.5% | 13.6% | 14.5% |
| Total Business | 17.4% | 30.8% | 25.1% | 13.0% | 14.7% | 19.8% | 18.5% | 12.5% | 12.3% |
| Res. Complaints per Mill. Res. Access Lines | 279.0 | 282.6 | 587.5 | 31.5 | 32.4 | 212.7 | 384.9 | 158.2 | 197.6 |
| Bus. Complaints per Mill. Bus. Access Lines | 106.5 | 115.3 | 178.0 | 7.7 | 15.4 | 125.7 | 59.3 | 55.3 | 75.3 |

Please refer to text for notes and data qualifications

Table 9.2
Switch Downtime & Trunk Blocking
Company Comparison - 2001

| Company | BellSouth | Qwest | SBC Ameritech | SBC Pacific | SBC Southwestern | Verizon North | Verizon South | Verizon GTE | Spir |
|--|-----------|---------|------------------|----------------|---------------------|------------------|------------------|----------------|---------|
| Total Access Lines in Thousands | 23,756 | 17,070 | 20,074 | 17,788 | 15,842 | 18,269 | 22,313 | 18,709 | 16,174 |
| Total Trunk Groups | 3,628 | 3,183 | 1,137 | 1,856 | 1,140 | 1,046 | 950 | 1,987 | 11,110 |
| Total Switches | 1,642 | 1,354 | 1,451 | 781 | 1,662 | 1,284 | 1,338 | 3,327 | 2,710 |
| Switches with Downtime | | | | | | | | | |
| Number of Switches | 97 | 488 | 160 | 282 | 172 | 61 | 85 | 52 | 238 |
| As a percentage of Total Switches | 5.9% | 36.0% | 11.0% | 36.1% | 10.3% | 4.8% | 6.4% | 1.6% | 8.8% |
| Average Switch Downtime in Seconds per Switch | | | | | | | | | |
| For All Events | 94.1 | 217.8 | 64.9 | 110.8 | 342.8 | 2612.9 | 31.3 | 87.1 | 291.1 |
| For Unscheduled Events Over 2 Minutes | 89.2 | 132.0 | 36.7 | 104.9 | 332.9 | 2608.9 | 28.9 | 87.0 | 85.4 |
| For Unscheduled Downtime More Than 2 Minutes | | | | | | | | | |
| Number of Occurrences or Events | 58 | 79 | 37 | 39 | 14 | 35 | 31 | 48 | 42 |
| Events per Hundred Switches | 3.5 | 5.8 | 2.5 | 5.0 | 0.8 | 2.7 | 2.3 | 1.4 | 1.5 |
| Events per Million Access Lines | 2.44 | 4.63 | 1.84 | 2.19 | 0.88 | 1.92 | 1.39 | 2.57 | 2.60 |
| Average Outage Duration in Minutes | 42.1 | 37.7 | 24.0 | 35.0 | 658.6 | 1595.1 | 20.8 | 100.5 | 91.8 |
| Average Lines Affected per Event in Thousands | 12.4 | 7.8 | 19.0 | 18.2 | 32.4 | 17.6 | 26.4 | 6.3 | 12.5 |
| Outage Line-Minutes per Event in Thousands | 265.5 | 319.9 | 344.2 | 703.9 | 19,692.1 | 57,458.8 | 241.6 | 395.1 | 742.4 |
| Outage Line-Minutes per 1,000 Access Lines | 648.1 | 1,480.5 | 634.5 | 1,543.3 | 17,402.6 | 110,082.4 | 335.7 | 1,013.7 | 1,927.9 |
| For Scheduled Downtime More Than 2 Minutes | | | | | | | | | |
| Number of Occurrences or Events | 6 | 141 | 36 | 1 | 15 | 11 | 3 | 0 | 77 |
| Events per Hundred Switches | 0.4 | 10.4 | 2.5 | 0.1 | 0.9 | 0.9 | 0.2 | NA | 2.8 |
| Events per Million Access Lines | 0.25 | 8.26 | 1.79 | 0.06 | 0.95 | 0.60 | 0.13 | NA | 4.76 |
| Average Outage Duration in Minutes | 10.7 | 9.1 | 17.9 | 4.0 | 5.9 | 5.8 | 2.7 | NA | 35.3 |
| Avg. Lines Affected per Event in Thousands | 4.7 | 5.8 | 19.6 | 4.3 | 51.6 | 33.8 | 22.3 | NA | 10.2 |
| Outage Line-Minutes per Event in Thousands | 33.3 | 61.0 | 361.3 | 17.2 | 267.5 | 127.5 | 55.2 | NA | 654.7 |
| Outage Line-Minutes per 1,000 Access Lines | 8.4 | 504.0 | 648.0 | 1.0 | 253.3 | 76.8 | 7.4 | NA | 3,116.6 |
| % Common Trunk Grps. Exceeding Blocking Objectives | 8.85% | 2.80% | 3.17% | 1.51% | 0.44% | 3.92% | 5.37% | 0.15% | 0.90% |

NA: Not applicable

Please refer to text for notes and data qualifications

Table 9.3
Switch Downtime Causes
Company Comparison. 2001

| Company | BellSouth | Qwest | SBC Ameritech | SBC Pacific | SBC Southwestern | Verizon North | Verizon South | Verizon GTE | Sprint |
|---|-----------|-------|------------------|----------------|---------------------|------------------|------------------|----------------|---------|
| Total Number of Outages | | | | | | | | | |
| 1. Scheduled | 6 | 141 | 36 | 1 | 15 | 11 | 3 | 0 | 77 |
| 2. Proced. Errors-- Telco. (Inst./Maint.) | 0 | 1 | 1 | 1 | 1 | 4 | 2 | 4 | 3 |
| 3. Proced. Errors-- Telco. (Other) | 4 | 4 | 3 | 1 | 0 | 0 | 2 | 1 | 4 |
| 4. Procedural Errors-- System Vendors | 10 | 2 | 7 | 1 | 2 | 2 | 7 | 1 | 4 |
| 5. Procedural Errors -- Other Vendors | 0 | 12 | 2 | 2 | 1 | 0 | 1 | 4 | 2 |
| 6. Software Design | 11 | 6 | 2 | 0 | 1 | 1 | 9 | 6 | 3 |
| 7. Hardware design | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8. Hardware Failure | 13 | 28 | 18 | 5 | 5 | 10 | 5 | 18 | 13 |
| 9. Natural Causes | 1 | 0 | 2 | 6 | 3 | 0 | 2 | 6 | 2 |
| 10. Traffic Overload | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11. Environmental | 0 | 0 | 0 | 8 | 1 | 0 | 0 | 0 | 1 |
| 12. External Power Failure | 7 | 22 | 0 | 0 | 0 | 4 | 0 | 8 | 0 |
| 13. Massive Line Outage | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 3 |
| 14. Remote | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 15. Other/Unknown | 3 | 0 | 2 | 14 | 0 | 14 | 3 | 0 | 3 |
| Total Outage Line-Minutes per Thousand Access Lines | | | | | | | | | |
| 1. Scheduled | 8.4 | 504.0 | 648.0 | 1.0 | 253.3 | 76.8 | 7.4 | 0.0 | 3,116.6 |
| 2. Proced. Errors-- Telco. (Inst./Maint.) | 0.0 | 5.4 | 19.8 | 19.1 | 0.6 | 84.4 | 9.7 | 51.1 | 385.9 |
| 3. Proced. Errors-- Telco. (Other) | 20.4 | 58.8 | 20.5 | 13.9 | 0.0 | 0.0 | 30.0 | 13.7 | 225.8 |
| 4. Procedural Errors-- System Vendors | 36.7 | 75.9 | 38.0 | 3.0 | 223.6 | 14.9 | 89.0 | 192.3 | 64.1 |
| 5. Procedural Errors -- Other Vendors | 0.0 | 17.7 | 16.1 | 755.7 | 218.0 | 0.0 | 0.4 | 90.4 | 99.4 |
| 6. Software Design | 160.9 | 39.1 | 17.8 | 0.0 | 4.1 | 4.6 | 49.7 | 178.1 | 73.7 |
| 7. Hardware design | 78.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 8. Hardware Failure | 95.3 | 89.5 | 310.2 | 105.7 | 107.2 | 124.6 | 68.2 | 317.4 | 230.9 |
| 9. Natural Causes | 21.6 | 0.0 | 204.1 | 3.6 | 12,005.2 | 0.0 | 17.2 | 91.1 | 50.3 |
| 10. Traffic Overload | 0.0 | 173.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 11. Environmental | 0.0 | 0.0 | 0.0 | 604.5 | 4,843.9 | 0.0 | 0.0 | 0.0 | 3.2 |
| 12. External Power Failure | 110.0 | 951.2 | 0.0 | 0.0 | 0.0 | 124.9 | 0.0 | 79.6 | 0.0 |
| 13. Massive Line Outage | 0.0 | 68.1 | 0.0 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 620.0 |
| 14. Remote | 113.7 | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 38.6 |
| 15. Other/Unknown | 10.6 | 0.0 | 8.0 | 37.0 | 0.0 | 109,729.1 | 71.5 | 0.0 | 136.1 |

Please refer to text for notes and data qualifications

Table 9.4
Customer Perception Surveys - Percent of Customers Dissatisfied
Company Comparison - 2001

| ompany | BellSouth | Qwest | SBC Ameritech | SBC Pacific | SBC Southwestern | Verizon North | Verizon South | Verizon GTE | Sprin |
|------------------|-----------|-------|------------------|----------------|---------------------|------------------|------------------|----------------|-------|
| Installations: | | | | | | | | | |
| Residential | 11.15 | 6.38 | 15.48 | 8.52 | 7.99 | 5.11 | 4.51 | 4.92 | NA |
| Small Business | 9.36 | 14.72 | 14.68 | 8.48 | 10.38 | 10.68 | 8.97 | 7.44 | NA |
| Large Business | 7.99 | NA | 17.88 | 9.01 | 6.74 | 4.93 | 6.64 | 4.79 | NA |
| Repairs: | | | | | | | | | |
| Residential | 17.59 | 9.95 | 19.22 | 9.95 | 11.67 | 13.84 | 13.03 | 12.21 | NA |
| Small Business | 9.91 | 9.85 | 15.72 | 6.86 | 8.42 | 11.79 | 10.95 | 10.24 | NA |
| Large Business | 6.97 | NA | 18.22 | 5.76 | 6.22 | 7.08 | 6.20 | 6.43 | NA |
| Business Office: | | | | | | | | | |
| Residential | 13.20 | 3.22 | 15.59 | 8.05 | 8.40 | 7.41 | 6.19 | 7.99 | NA |
| Small Business | 12.95 | 6.68 | 15.72 | 7.14 | 9.38 | 9.45 | 9.94 | 9.33 | NA |
| Large Business | 7.73 | NA | 20.99 | 10.15 | 8.41 | 4.49 | 8.89 | 10.13 | NA |

NA: Not available

Please refer to text for notes and data qualifications

Table 9.5
Customer Perception Surveys • Sample Sizes
Company Comparison • 2001

| Company | BellSouth | Qwest | SBC Ameritech | SBC Pacific | SBC Southwestern | Verizon North | Verizon South | Verizon GTE | Sprin |
|------------------|-----------|-------|------------------|----------------|---------------------|------------------|------------------|----------------|-------|
| Installations: | | | | | | | | | |
| Residential | 22,992 | 6,714 | 11,542 | 12,630 | 10,059 | 19,128 | 18,673 | 25,202 | NA |
| Small Business | 17,931 | 4,192 | 10,893 | 11,929 | 10,011 | 17,286 | 18,487 | 21,991 | NA |
| Large Business | 5,782 | NA | 3,051 | 2,329 | 2,312 | 1,136 | 1,129 | 1,127 | NA |
| Repairs: | | | | | | | | | |
| Residential | 23,237 | 1,508 | 11,432 | 12,954 | 11,400 | 19,097 | 18,668 | 25,112 | NA |
| Small Business | 19,346 | 465 | 11,478 | 11,478 | 11,295 | 19,022 | 18,397 | 23,636 | NA |
| Large Business | 6,052 | NA | 3,691 | 2,084 | 2,865 | 1,115 | 1,049 | 1,088 | NA |
| Business Office: | | | | | | | | | |
| Residential | 38,991 | 6,714 | 24,794 | 24,572 | 22,594 | 11,107 | 14,780 | 16,518 | NA |
| Small Business | 10,710 | 4,192 | 21,813 | 21,913 | 21,490 | 4,023 | 6,089 | 12,801 | NA |
| Large Business | 673 | NA | 2,479 | 591 | 2,663 | 869 | 855 | 819 | NA |

NA: Not available

Please refer to text for notes and data qualifications